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## THE LARGER SPECIES OF ARGYNNIS, AND THE MYSTERY OF THEIR LIFE HISTORY.

BY H. H. LYMAN, M. A., MONTREAL.

Although the larger species of *Argynnis* which fly in the Eastern part of this Continent are known in all their stages, through the most valuable labours of Mr. William H. Edwards, there are certain problems in regard to their life history which have baffled the efforts of all the entomologists who have attempted to solve them.

On page 124, of Vol. VI. of CAN. ENT., Mr. Edwards wrote as follows :—

" There are one or two points in the life history of the larger Argynnidæ that are not yet clear. With us, *Cybele* male is on the wing from the 25th of May to the 10th of June, as I have noticed for several successive years. Probably *Aphrodite* nearly as soon, and *Diana* first appears about the 20th of June. Shortly after the 1st of June the female of *Cybele* is to be seen, and both sexes abound in the clover fields. By the end of June *Cybele* has become scarce, and the individuals to be seen have lost their freshness and are broken and worn. It is certain that these early appearing females have not matured eggs and laid them, because at no time from June to August will anything but rudimentary eggs be found by dissecting, and the eggs do not become distinguishable to the eye until August. They then mature rapidly, and in a few days attain full size. I am confident that no eggs are laid till August. But about the first of that month, and all along to near the end of it, there appear in great numbers both fresh males and females, as if just from chrysalis, with no abrasion of the hairs on thorax between the wings, which spot is the first to show wear. (I doubt if an *Argynnis* could fly two days without thus giving evidence of it) There are flying at the same time many worn individuals, especially females. These last are the first to deposit their eggs, but shortly after, and up to the time of frosts, the others also are in condition to do the same. I see no other explanation of the appearance of these freshly emerged butterflies than that they have formed part of the brood of caterpillars hatched the previous fall, some of which brood yielded the butterflies that came out in May and June, and the remainder continued in the larval or chrysalis state until August, and upon these last the perpetuation of the species largely depends, for nine-tenths of the June flight must have been destroyed long before August. If I am right the preparatory stages of the August *Cybele* must consume eleven months out of the twelve."

On page 73, of Vol. XII., CAN. ENT., Mr. Edwards referred to the above extract and then continued as follows :—

"I now am of the opinion that there are two annual broods. The experience in fall of 1878, with those larvæ of *Alcestis* which proceeded to feed instead of going into lethargy, and passed two and three moults within a very much shorter period than has been observed in the spring, showed that six weeks in midsummer might not improbably be long enough for all the changes. Perhaps also there are but four larval moults in the summer brood, as in some of the Meliteas, though there are five in the winter brood. Every stage would be shortened by the hot weather of July. On 14th June, 1878, I saw a pair of *Cybele* flying in copulation. In all instances where this has happened with butterflies under my observation, and the females have been secured (and this includes *Arg. Atlantis* and *Myrina*), eggs have been laid within a few hours after. Eggs laid 15th June would allow about two months for the several stages to imago."

In Mr. Scudder's Butterflies of New England, on page 549, after quoting in full the first of the above extracts, the author proceeds :—

"No such interrupted series of emergences has been detected in the history of our three species in New England, but if, as is probable, this is a first step towards true digonism, it might well be looked for in Southern New England, and should especially be sought for in *A. Cybele*."

Mr. Scudder proceeds to say that in the North there is a prolonged but uninterrupted emergence of fresh material from the chrysalis and suggests that the phenomena may be attributed to lethargy in the caterpillar, periodic and fixed in the South, casual and irregular in the North.

The life history is given by Mr. Scudder as follows :—

"The insect is single brooded in New England, passing the winter in the larval state. The caterpillars become full grown in June, and the earliest butterflies appear in the latter part of June, sometimes as early as the 16th in the latitude of Boston, usually not much before the 21st; become common by the 1st of July, when the female first emerges; continue to escape from the chrysalis until at least the middle of July, and fly until the middle of September and occasionally later. The butterflies generally pair at the end of July, but the eggs do not begin to assume their proper size until about the middle of August, and are not laid until the last of August or first of September. Miss Soule obtained eggs in Stow, Vt., on August 20, which is the earliest New England date known to me."

"The eggs hatch in about fifteen days, but the caterpillars from them go immediately into hibernation without eating anything more than their egg shells."

From 1868 to 1875, inclusive, I spent the summers, from about the 15th July to the first week in September, on Cape Elizabeth, near Portland, Me., and I observed the phenomena of the second emergence described by Mr. Edwards. When I first arrived the Argynnides were flying, but in a worn and dilapidated condition, but about the 1st of August fresh examples appeared and I observed them in copulation with some of the worn ones, but later only those of the second flight were seen in coitus.

On 1st July, 1891, when on a Dominion Day excursion to Vaudreuil, Q., I observed a pair of *A. Cybele* in copulation, resting on a bush within a yard of where I was standing. Oblivious for the time of the interest and importance of the fact, I did not secure them, and so lost the opportunity of trying to obtain eggs at that time.

On 2nd July, 1894, I went out to St. Therese to look for females of *Cybele*, but though plenty of males were on the wing, no female was seen.

On 14th July I went up the mountain for the same purpose and was fortunate enough to secure one in fair condition. This I immediately confined over a violet planted in a pot, by a wire gauze cylinder, but fearing that the eggs might possibly be laid upon the wire gauze, I substituted a net cage on the 15th. This cage was kept out of doors on a back gallery, but on the 18th was upset and demoralized by a too inquisitive feline anxious to find out what sort of a bird was kept in such an insecure cage.

On my return home in the evening I proceeded to examine the wreck, though I supposed the butterfly had escaped, but on carefully stirring the spilled earth the poor thing struggled out of its grave and was carefully secured, and on examination was found to be sound, though with sadly damaged plumage.

Two days later I carried it out in a box to Paul Smith's, in the Adirondacks, whither I went to look for *Colias Interior*, and rigged up a fresh cage for it by planting a violet in a tomato can. I cannot be sure when the first eggs of *Cybele* were laid, but the two first found were observed on 30th July, which is three weeks earlier than any previous record for anywhere near this latitude, according to Mr. Scudder, but, curiously enough, is the same date as recorded by Wm. Buckler for *Argynnis Paphia* in the first volume of "Larvæ of British Butterflies and Moths," as noted by Mr. Scudder.

This female lived for 29 or 30 days in confinement, and laid eggs at various times up to about 12th August. Comparatively few eggs were laid and most of them hatched in due course, the first on 18th August, giving an egg period in hot summer weather of not less than 19 days and probably longer. This larva behaved in a very curious manner and was a subject of much interest. It was placed on a violet planted in a small pot and left out over night without any cage and in the morning it could not be seen and I feared it had escaped, but placed a small wire gauze cylinder over the plant.

On the 20th it was carried with the rest of my menagerie on a holiday trip to Murray Bay, Q., and on 23rd was found crawling about on the plant and it looked larger than when placed upon it.

On 25th, I observed it feeding on one of the young, unexpanded leaves near the roots, in the morning and also at lunch time, but by evening it had disappeared from view.

On 26th, observed larva in the evening resting near the roots.

On 27th, found in same place in the morning; at 1:40 p. m. it was half way up the stem of one of the leaves, and at 3:10 p. m. in the same position.

On 28th, in morning, it was in same position; later it was seen crawling about the lower curved stems; by evening it had disappeared.

On 29th, still in hiding; later discovered it resting on a leaf-stalk near leaf.

On 30th, in same position on leaf-stalk, but found that a little had been eaten out of each side of the approximate edges of the leaf; the eating on each side made the injury to the leaf extremely inconspicuous. At 1:15 p. m., found it on this leaf for first time, later it disappeared.

On 31st, still in hiding.

On 1st September, found larva had left plant, which had been left uncovered since 23rd, and was on the shelf; replaced it on the plant and put wire gauze over it. Found remains of an egg shell on the plant.

On 2nd September, larva on leaf, then on stem of another leaf; later had disappeared.

On 4th, I left for Quebec by the day boat and placed my paraphernalia in what I thought was a safe place in the saloon, but some one knocked the wire gauze cover partly off the pot and this larva apparently escaped, for I never found it again. It had lived and fed sparingly for seventeen days, and had grown slowly but perceptibly, although it had not passed a moult.

Three more eggs hatched on 5th Sept. and another on 6th, but though I found, on the 7th, a leaf a little eaten, the larvæ did not seem inclined to feed, but seemed to rest most of the time in a lethargic condition.

These eggs which hatched last must have been laid not later than 11th or 12th of August at the latest, which would make the egg stage not less than about 24 or 25 days, but the climate at Murray Bay would doubtless

retard their development somewhat. At least one egg did not hatch, though the larva seemed to be fully developed inside it. As soon as I found that these larvæ would not feed and that they seemed to be shrinking in size, I put them into a small pill box and the unhatched egg in another and placed them along with a pill box containing larvæ of *Colias Interior*, in a wide mouthed glass jar, with a bung to close the mouth, and put it in the refrigerator. Some time afterwards I found that by some means water had got into the jar and the boxes were wet and mouldy, and so took them out. The larvæ were still alive, so I placed them out of doors, and later, when the snow came, I put them in a box and buried them under the snow. The *Colias* larvæ survived the winter, but these did not.

On the 10th of June last I went out in the evening to St. Therese on an entomological quest, and the next day I found *Cybele* ♂ on the wing. Messrs. Winn and Gibb have also found it as early, and I think that this early appearance in this latitude proves that these early fliers could not have come from larvæ which hibernated direct from the egg, but that the larvæ must have passed one or more moults before hibernation. Mr. Edwards found the pupal period to be 22 to 24 days, in Virginia, in some cases and from 16 to 20 days in others. Now, it is probable that in this latitude the period would be as long as the longest in Virginia, but even the shortest would carry back pupation into the month of May, and as the snow often lies till late in April and the early part of May is frequently cold, it would only leave four or five weeks of cool weather for the full growth of this larva, which is said to be decidedly sluggish in its growth, which seems to me utterly impossible. *Colias Interior*, which passes one moult before hibernation, develops rapidly, and has a pupal period of only about ten days; does not attain the imago state in the Adirondacks for several weeks later, though the ones reared by me in confinement had their period of emergence accelerated by about three weeks.

My experiments so far have produced rather negative results, but they prove that eggs are laid in July, that the resulting larvæ sometimes feed and grow perceptibly, and, I think also, that the species flies too early in this latitude to have come from larvæ which hibernated direct from the egg.

I do not like theorizing upon such insufficient data, but I am inclined to the hypothesis that there are two almost distinct cycles of this species

which overlap somewhat, some of those of the earlier cycle living until after the appearance of those of the later one, and in some instances mating with them.

Upon this hypothesis the larvae which hibernated direct from the egg would all start feeding at about the same time and so would account for a simultaneous appearance of many fresh specimens about the beginning of August, while those which emerge over a considerable time in the early summer would be from those larvae which had passed one or two moults the previous year.

Mr. Edwards's later view, that there are probably two broods in Virginia, the one descended from the other, I hold to be untenable in view of the long egg period, even in the heat of early August. Nor am I inclined to accept as probable the suggestion of Mr. Scudder, based upon the experience of Vaudouer in the case of the European *Euphrosyne*, of a lethargic period in the case of that portion of the brood which does not reach the imago state till August.

I hope to pursue my experiments further, and to that end appeal for the assistance of other lepidopterists, and will gladly pay, either in money or exchange, for living specimens of the female of this species sent me not later than the first week in July. These can be sent by mail in suitable boxes addressed to me at 384 St. Paul St., Montreal.

#### TRYCHOSIS TUNICULA-RUBRA, N. S.

REV. THOMAS W. FYLES, SOUTH QUEBEC.

While studying the habits of *Gelechia gallæ-diplopappi*, I have repeatedly met with a parasite, in the galls of the moth, that I have not found elsewhere.

I have submitted imagos of the species to several of our most eminent hymenopterists, and all agree that the species is new to science and undescribed. To Mr. Ashmead I am indebted for the information that it will properly come into Foster's genus *Trychosis*.

The full-grown larva of the species is a fusiform, legless grub, three-tenths of an inch long, and having thirteen segments, counting the head. The anal segment is somewhat elongated. The creature is of a white waxen appearance, with a tinge of pink; and it has a few short hairs on its face and along the back and sides. The spiracles are well defined. On the ventral surface of the grub are a number of extensile and retractile pads or pseudopodia, by the aid of which it fastens itself to its victim, or

moves about within the hollow gall. Its mouth is large and set well up in the face, and the upper lip has a beak-like curve.

On the 10th of July, 1891, I witnessed the cleaning out of a chrysalis case of *G. gallæ-diplopappi* by a grub of this species. The creature, having finished its meal, left the case and immediately proceeded to spin its cocoon. When completed, this cocoon was long and sack-like, but compact in texture. It was white at first, but it darkened with age. The perfect insect burst from it on the 10th of June of the following year.

On another occasion, on opening a gall, I found a grub of the species just finishing a dessert of the very case of its victim. In this instance the grub, in a short time, voided the indigestible parts of its meal in dark pellets, and then commenced to spin.

I opened a cocoon of the parasite on the 25th of March last, with a view to describing the pupa. I found that the pupal change had not taken place. Preparations for it, however, seemed to be commencing. The head was becoming rounded; the mouth was sealed up, but its outline was still apparent; the pseudopodia were disappearing; the body was becoming attenuated.

I put the creature back into its ruptured envelope, but it was not content to remain in it—it wriggled out, so I placed it in a clean paper box, and, I am glad to say, its changes went on as if nothing unusual had happened.

By the 1st of April the head, thorax and abdomen of the insect could be traced under the skin. The first two had become yellowish, and the eyes, which I had first noticed as faint streaks, now showed as brownish oblong patches.

In the night of April 1-2 the pupal change took place. In the morning I found the shrivelled larva skin still clinging to the extremity of the body. The main parts were now of distinct form, and the antennæ and limbs appeared in proper shape, extended beneath the insect, and beautifully white and pellucid. The only colouring was in the eyes, which were large and brown.

On April 6th I found that the ocelli were distinctly seen, and that the upper part of the abdomen was beginning to darken.

On the 8th the thorax began to turn black. On this date I made a drawing of the pupa. The insect seemed to object to the strong light in which I had placed it. I noticed twitchings of the legs and antennæ. I therefore put it back in its box as soon as possible.

On the 9th I found that the head and thorax were quite black, while the legs and antennæ were still pellucid.

On the 11th the red of the three first segments of the abdomen on the upper side and the black of the remaining segments on the upper side were seen. The upper portions of the legs also and the bases of the antennæ were taking colour.

On the 13th the insect was fully coloured, with the exception of a white streak on either side of the abdomen. The legs had begun to spread themselves.

In the night of the 13th the wings burst from their cases, and before the close of the day following the insect had risen upon its feet.

No doubt the warmth of my house, and the rupturing of the cocoon, hastened the changes of the insect. I should say the usual time of the creature's appearance in the perfect state is the middle of June. The galls formed by the Gelechian begin to show themselves in the first week of June, and there is only one brood of *G. gallæ-diplopappi* in the year.\*

Descriptions of the imagos, male and female, of *T. tunicula-rubra*:

♀.—Expanse of wings, one-half inch; length of body, one-quarter inch; length of antenna, two-tenths inch; length of ovipositor, one-tenth inch.

HEAD black, punctured, and set with whitish hairs; face convex; clypeus somewhat nasiform, hairy; compound eyes of a rich madder-brown; ocelli black and prominent; palpi long, five-jointed, flavescent; antennæ filiform, basal joint oblong-ovate, black and hairy. In the flagellum, which is brown, are thirty-one joints, of which the first, counting from the ring-joint, is four times longer than thick.

THORAX black, shining, deeply punctured; mesothorax and scutellum convex; legs long and slender, the coxae black, trochanters and femora fuliginous, tibiae and tarsi ferruginous; wings iridescent, slightly hairy; costal and externo-medial nervures hairy; stigma large and brown; areolet rather large, pentagonal; cubito-discoidal cell large; the third discoidal cell and the first apical cell of moderate size; the second apical cell large; the basal nervures slightly and regularly curved.

ABDOMEN fusiform; petiole rather long and slender, recurved, jet black; the three first abdominal segments deep red, the remainder black; ovipositor ferruginous, straight, stiff and pointed—its case fuscous, blunt and hairy.

♂.—General appearance darker and less robust than that of the female. Antennæ dark brown, nearly black, twenty-six joints in the flagellum, the first being five times as long as thick; eyes prominent, brown; ocelli black; palpi five-jointed, brown; coxae black, hairy and punctured—the hindmost pair unusually large; first pair of legs ferruginous; the rest fuliginous, with knees of lighter colour; tibial spurs stout; wings smoky; abdomen long and slender; petiole black, extended, horn-shaped; three following segments red, the first and third edged with black; the rest of the abdomen black.

\* Wherever I have found *T. tunicula-rubra* I have found the skin over the opening of the gall ruptured, I suppose by the ovipositor of the mother Trychosia.

## THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

## XVI. THE CHRYSOMELIDÆ OF ONTARIO AND QUEBEC—(Continued).

## TRIBE IV.—CLYTHRINI.

The species included here are of rather short, cylindrical form, sometimes suggesting in shape the *Cryptocephalini*, though easily separated, so far as our genera are concerned, by the shorter and stouter antennæ. Most of them are Southern or Western in distribution, and the few genera recorded from within our limits may be known among themselves by these characters :—

## A. Front coxae contiguous.

- Large ; colour, in our species, chiefly yellowish or testaceous ; tarsal claws simple . . . . . *Anomæa*.
- Small ; colour in our species bluish, with four yellowish or reddish elytral spots . . . . . *Babia*.

## AA. Front coxae separated by the prosternum.

- Large ; eyes transverse, emarginate . . . . . *Megalostomis*.
- Small ; eyes oval, not emarginate . . . . . *Coscinoptera*.

It seems certain that *Megalostomis* cannot be retained as a member of the Canadian fauna, as the species included therein have never been found farther north than Kansas.

## ANOMÆA, Lac.

Represented by *Anomæa laticlavia*, Forst., found occasionally on the rag-weed (*Ambrosia*). It is apparently, however, quite a general feeder, having been taken also on various legumes, and on oak, cotton, and willow. In colour it is fulvous, elytra a little lighter, their sutural and outer margins narrowly bordered with black; under side of body, excepting the prothorax, dark, but densely covered with light pubescence. Legs yellow, often with tibiæ and tarsi more or less blackish. The male has more deeply serrate antennæ and longer anterior tibiæ than the female. Length, .28-.32 in. Form cylindrical.

## COSCINOPTERA, Lac.

*C. dominicana*, Fabr.—Black ; of robust form, much less elongate than *Anomæa*. The upper surface is sparingly covered with a light-coloured pubescence, the under side much more densely so. Thorax densely, not very coarsely, punctured and with median smooth line.

Elytra more coarsely but less densely punctured. Length, .20-.22 in. The only Canadian specimen I have seen was sent me from Toronto by Mr. R. J. Crew. Fig. 13 [after Riley] represents this insect in all its stages: *a*, the larva extracted from its case; *b*, larva dragging its case, which is composed of chewed fragments of leaves; *c*, beetle, enlarged to show punctures; *d*, beetle, natural size; *e*, egg, highly magnified; *f*, head of larva, under side; *g*, head of male beetle; *h*, jaw of same; *i*, eggs, natural size, showing mode of attachment to leaves; *j*, leg of larva; *k*, jaw of same; *l*, maxilla of same.

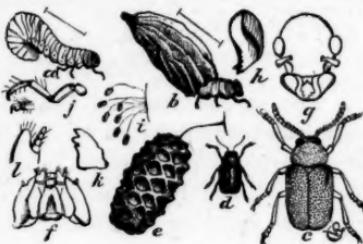


Fig. 13.

#### MEGALOSTOMIS, Chevr.

A record of *M. subfasciata*, Lec., occurs in the supplement to the Label List of Coleoptera for 1889. It is a rather large insect (.24-.30 in.), nearly black, with cinereous pubescence. The elytra each have a large basal red spot reaching from the immediate vicinity of the outer margin to the neighbourhood of the suture. The size and coloration will separate it from any of the known Northern Clythrini. The recognized range is from Arizona to Kansas.

#### BABIA, Chevr.

A pretty, shining black insect of somewhat oblong form, shining surface, the elytra with a humeral and subapical red spot on each, the anterior the larger. The striae are coarsely punctate. Antennae short, the last character serving to separate it easily from some of the black and red Cryptocephali with which beginners occasionally mix it. The species is *B. quadriguttata*, Oliv. Length, .14-.16 in.

#### TRIBE V.—CHLAMYDINI.

These curious little insects can be mistaken for nothing else. They are of very short, compact form, the upper surface of the body covered with large tubercles; in colour they range from dull brown to black or bronze. The legs are contractile, the antennae short. As has often been remarked, they resemble the excrements of caterpillars, and so closely as

to render their detection, even when swept into the net, a matter of some uncertainty. The two genera are thus distinguished :—

- Antennæ serrate from the sixth joint..... *Exema*.  
 Antennal serrations beginning before the sixth joint..... *Chlamys*.

**EXEMA, Lac.**

A small black, rough beetle, about .10 in. long, often variegated with very small yellow spots or even with the head and prothorax almost entirely yellow. The legs are usually more or less yellow, the antennæ entirely so. The Canadian *E. dispar*, Lac., is considered a variety of *E. conspersa*, Mann.

**CHLAMYS, Knoch.**

Represented by *C. plicata*, Fabr., a larger insect than the preceding, and of shorter, more robust form. The tuberosities of the upper surface are very pronounced, the colour more or less metallic brown or black, legs black. The variety *polycocca* is that in which the tubercles are more distinctly separated and not aggregated into the form of ridges as in typical *plicata*. Length, .16 in. Fig. 14 represents the larva (*a*) and its curious sack.

FIG. 14.



**TRIBE VI.—CRYPTOCEPHALINI.**

Form robust, more or less cylindrical, and sometimes even approaching globularity. Elytra rather short, leaving the tip of the abdomen exposed, not tuberculate, striato-punctate. Antennæ usually long and slender. Colours usually arranged in a variegated pattern, taking on various combinations of spots or stripes, which are sometimes very inconstant; occasionally a species is found which is unicolorous. The genera are thus separated in the "Classification":—

- A. Claws appendiculate (*i. e.*, with a square dilatation at base; small species).
  - Form robust, rounded..... *Monachus*.
  - Form more elongate, cylindrical..... *Diachus*.
- AA. Claws simple (mostly larger species).
  - b. Prothorax not margined at base, crenulate.
    - Front edge of prothoracic flanks sinuous or toothed. *Bassareus*.
    - Front edge of prothoracic flanks straight... *Cryptocephalus*.
  - bb. Prothorax margined at base, not crenulate; prosternum feebly channelled..... *Pachybrachys*.

## MONACHUS, Chevr.

Two very robust species of blue colour belong here; they may be obtained by sweeping meadows. Dr. Leconte separates them thus:—

Form oval; prothorax smooth, opaque, rows of elytral punctures feeble.....*ater*, Hald.

Form ovate; prothorax with punctures near the base, rows of elytral punctures strong.....*saponatus*, Fabr.

Both are of about the same size (.10-.12 in.) and have rather elongate antennæ, which are testaceous at base.

## DIACHUS, Lec.

Contains the smallest Canadian *Cryptocephalini*. They are of cylindrical-oval form, and somewhat metallic colours, overlaid on blue or green. The two recorded from within our limits are:—

Elytral striæ obliterated behind the middle; sides of prothorax, antennæ and legs testaceous; .06-.08 in.....*auratus*, Fabr.

Outer elytral striæ impressed, curving around at tip; prothorax smooth; colour, dark blue-green, antennæ and legs reddish-brown; .08-.11 in.....*catarius*, Suffr.

## BASSAREUS, Hald.

The two species look much like *Cryptocephalus*, but may be distinguished by the character given in the table. *B. detritus* measures from .18-.22 in., and is of a blackish colour, the elytra with four red spots; the prothorax is opaque, sparsely punctured. The other species, *B. mammifer*, has a smooth, shining prothorax, and varies from .14-.22 in. in length. The typical form has elytra spotted like those of *detritus*; i. e., a large anterior spot on each wing-cover and an apical one. It runs, however, through the following varieties, which have received separate names: *sellatus*, Suffr., in which the anterior elytral spot is reduced in size and the sides of the prothorax are white; *pretiosus*, Melsh., with a larger anterior elytral spot, which is connected with some small basal spots, the prothorax with sides and two spots at base white; and *luteipennis*, Melsh., with yellow elytra.

## CRYPTOCEPHALUS, Geoffr.

A number of species occur in Canada, some of which will be found mixed, in the collections of beginners, with *Babia 4-guttata* and the species of *Bassareus*. They are, however, readily separated when once attention has been called to the characters in use for the purpose. The

following table will, it is thought, serve for the separation of the Canadian forms among themselves without reference to prosternal characters, for an exposition of which the student is referred to Dr. Leconte's paper on the genus in *Trans. Amer. Ento. Soc.* for 1880.

- A. Elytra yellow with two oblique black stripes ; prothorax reddish, usually with two basal oblique yellow spots. .17-.21 in. (Fig. 15)..... *Venustus*, Fabr.

AA. Elytra spotted.

- b<sup>1</sup>. Spots numerous, arranged 2, 2, 2, 1 on each elytron, yellowish on brown or black ground. Prothorax reddish. .16-.22 in..... *guttulatus*, Oliv.

- b<sup>2</sup>. Spots at base confluent into a transverse band which extends to the sixth stria, a marginal spot just before the middle extending to fifth stria, an interrupted post-median band and apical spot, all yellow. Ground colour of elytra brown. Prothorax brown. .12-.16 in..... *badius*, Suffr.

- b<sup>3</sup>. Spots very different in size, the middle ones usually confluent into a large blotch on the sutural region, the others usually quite small and arranged in longitudinal rows; they are brown or black on a pale yellow ground. The prothorax is ferruginous or nearly black; sides and front, and often also two oblique basal spots, yellow. .16-.28 in. *mutabilis*, Melsh.

- b<sup>4</sup>. Spots red, not exceeding two on each elytron; ground colour black or blue-black, prothorax black.

- c. Humeral spots confluent on median line so as to form a band extending quite across (var. of next species). *notatus*, Fabr.

- cc. Humeral spots separate.

Larger and more robust; humeral spot large, extending along sides, apical spot variable in size. .14-.22 in..... *quadrimaculatus*, Say.

Smaller and more slender; humeral spot oblong, slightly wider behind, hardly reaching the base. Apical spot rounded. (The var. *q-guttulus* differs only in having the humeral spot longer, reaching to the middle of the length of the elytra.) .10-.12 in. *quadruplex*, Newm.



FIG. 15.

**AAA.** Elytra plain. Colour testaceous or slightly brownish; prothorax densely rugosely punctured. .12-.16 in.... *Schreibersi*, Suffr.

It should be remarked that nearly all of these are very variable in colour, but the table covers all of the recorded named varieties for East Canada. Any specimens which appear not to come under any of the names given should be referred to specialists.

**PACHYBRACHYS,** Chevr.

Contains a number of small species in which the outer striae of the elytra are usually completely confused and the inner ones tortuous and irregular. They have been tabulated by Dr. Leconte, in the paper cited, and in this as well as the preceding table we have drawn upon his work for many characters.

**A. Colours of upper surface definitely arranged.**

**b<sup>1</sup>.** Striped yellow and black or brown.



FIG. 16.

Suture broadly black, each elytron with two broad stripes and narrow margin black. Thorax with M-like brown mark. .10-.14 in.... *litigiosus*, Suffr.

I Suture very narrowly black, each elytron with a broad oblique stripe, narrow outer margin and an intervening row of spots black. Thorax either entirely yellow, ferruginous, or yellow with ferruginous, M-like mark. .14-.22 in.

(Fig. 16)..... *viduatus*, Fabr.

**b<sup>2</sup>.** Opaque black, prothorax with sides, front margin, anterior portion of median line and two basal spots, red. This red may be variously reduced. ,16-.20 in.... *trinotatus*, Melsh.

**b<sup>3</sup>.** Yellow above, head with black spot on crown, prothorax with a black spot on each side, and a somewhat Y-shaped one at middle. Elytra with humeral spot and a large V on suture, which joins at its apex with an irregularly indented transverse subapical band, black or brown. These markings may become indistinct at times. .06-.12 in.... *tridens*, Melsh.

**AA.** Uniform opaque black. .10-.14 in..... *carbonarius*, Hald.

**AAA.** Colours more or less mottled.

**c.** Sides of prothorax strongly rounded and incurved near base; hind angles rounded.

Black, mostly opaque, upper surface mottled with small white dots; prothorax sometimes red at sides, femora often with a yellow spot. Elytra confusedly coarsely punctured over most of the surface. .13-

.16 in..... *luridus*, Fabr.

Black, opaque, elytra with fewer confused punctures, white spots more numerous; pygidium with testaceous spots, legs testaceous in great part.

.10 in..... *femoratus*, Oliv.

cc. Sides of prothorax obliquely broadly rounded or straight, not incurved behind.

Punctures of prothorax and elytra uniform, two striæ visible at sides; upper surface dull ochreous clouded with brown. .08-.12 in..... *hepaticus*, Melsh.

Punctures of elytra more or less irregular, striæ visible at sides and behind. Black, opaque, prothorax with sides and dorsal spots red, elytra with a broad irregular band from the side almost to the suture.

.11-.14 in..... *subfasciatus*, Hald.

The above scheme includes all of the species known from East Canada which are included in Dr. Leconte's table, which has been followed for the most part. Three recorded forms, *atomarius*, *infaustus*, and *sobrinus*, are left unaccounted for; they belong to a group of small species, mostly mottled, in which the prothorax is formed as in the division cc, the elytral sculpture consisting usually of an irregular punctuation, with the striæ visible chiefly at sides and behind. The prosternum is broad and only very slightly concave, which character will separate them from the species preceding *hepaticus*, since the prosternum in all those is sulcate. A careful study is required, with reference to the types, before anything further should be attempted.

We have much pleasure in recording that the Honorary Degree of LL.D. was conferred upon two members of the Entomological Society of Ontario — Professor WILLIAM SAUNDERS, F. R. S. C., F. L. S., F. C. S., Director of the Experimental Farms of the Dominion, and Mr. JAMES FLETCHER, F. R. S. C., F. L. S., Dominion Entomologist and Botanist,— at the recent convocation of Queen's University, Kingston, Ontario. We beg to offer our esteemed friends our very hearty congratulations upon this well-deserved honour.

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## FIVE NEW BEES OF THE GENUS CALLIOPSIS, FROM NEW MEXICO.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

*Calliopsis meliloti*, n. sp., ♀.—Length, 5 mm.; head and thorax wholly black, abdomen very dark brown, with yellowish-white markings. Head, thorax, legs, and sides of abdomen with abundant long dull white hair. Clypeus prominent, shining, with conspicuous sparse punctures, its upper portion longitudinally sulcate in the middle, its whole surface appearing bare, with only very short, inconspicuous hairs. On each side of the clypeus is a shining bare eminence. Vertex closely punctured. Mandibles brown. Antennae quite short, the hairy scape not much less than half as long as the flagellum, the last joint of which is truncate and somewhat flattened.

Tegulae shining testaceous. Dorsum of metathorax bare, smooth. Legs dark, knees and terminal joints of tarsi becoming paler. Wings quite short, hyaline, iridescent, nervures and stigma light reddish-brown. Second submarginal cell about three-fourths length of 1st; narrowed one-half to marginal. Abdomen short and broad, with broad creamy-white bands; that on first segment narrowly interrupted in middle, and roundly notched on each side behind; that on second very broadly interrupted, and also notched at sides; those on third and fourth entire, notched at sides behind; finally an obscure broad subrufescent band partly on fourth and partly on fifth segment. Anal fimbria dirty white.

Habitat.—Las Cruces, N. M., on the College Farm, May 1st, 1895; swept from *Melilotus indica*, together with *Nomada*, *Sphecodes*, *Prosapis*, and four species of *Halictus*, viz.: *bardus*, *stultus*, *pectoraloides*, and *meliloti*.

It is related to *C. cinctus*, Cr., but differs in the abdominal bands being white instead of yellow. The anal fimbria not fuscous, the wings not at all dusky. It has some superficial resemblance to *Perdita alborivittata*.

*Calliopsis hirsutifrons*, n. sp., ♂.—Length about 6 mm.; pitch-black, very shiny, thorax and abdomen without any pale markings, face-markings creamy-white. Face, including clypeus, scape, cheeks, occiput, sides of thorax, post-scutellum, metathorax except basal middle, legs, and lateral hind margins of abdominal segments, with rather dense and fairly long white pubescence. Head transversely oval, ocelli small and close together, vertex with no distinct punctures; clypeus except the usual

dots, and triangular lateral face-marks, white, the latter in shape not very far from a half-circle, but the ends more produced and the inner (orbital) margin a little concave. Mandibles mostly white without. Flagellum black above, coffee-brown beneath.

Disc of mesothorax with conspicuous, very sparse punctures; at sides of mesothorax, and on scutellum, they are much closer. Tegulae dark chestnut-brown. Legs black, anterior tibiae in front, and first joint of all the tarsi, cream colour; remaining joints of tarsi subrufescent. Claws deeply cleft. Wings hyaline, with a faint smoky tinge, which does not extend to the external margin; nervures and stigma dark brown, marginal cell long, the tip roundly truncate, minutely appendiculate. Second submarginal a little shorter than 1st, narrowed a little less than one-half to marginal. Abdomen narrow, strongly but rather sparsely punctured, the segments transversely grooved adjacent to the sutures. Hind lateral margins of segments with white hair bands.

Habitat.—Albuquerque, N. M., middle of August, 1895 [Ckll., 4527]. Something like *C. pauper*, but hairy, and the tibiae are differently marked. It resembles a good deal the ♂ of *C. albitarsis*, which I took on *Rudbeckia laciniata*, at Santa Fé, N. M., July 19th. In *albitarsis*, however, the face is not nearly so hairy, the face-marks are pale yellow, and the lateral marks are obtuse instead of pointed above.

*Calliopsis fraterculus*, n. sp., ♂.—Length about  $6\frac{1}{2}$  mm., pitch-black, with the clypeus, triangular marks at sides of face, and tibiae in part, pale lemon-yellow, tarsi light. Head broader than long, shining, the ocelli in pits, a conspicuous prominence adjacent to the summit of each eye, occiput and cheeks with large, more or less confluent, punctures. Vertex with very few punctures, front with large subconfluent punctures; clypeus punctured, high, light yellow, with its piceous apical margin produced into a tooth on each side; lateral face-marks triangular, rounded above, not extending as high as antennal sockets; labrum truncate, mandibles wholly dark; antennae short, reaching about to tegulae, flagellum dark brown. Thorax wholly dark, with large punctures; pubescence of head and thorax sparse and inconspicuous, white, specially noticeable only on each side of antennae, on border of prothorax, beneath the wings, and at the sides of the metathorax. Punctures of scutellum and post-scutellum very large and like those of mesothorax, those of metathorax smaller and closer. Base of metathorax with obscure longitudinal wrinkles, but no well-defined smooth space behind them. Tegulae shining dark reddish-

brown. Wings fuliginous, nervures and stigma piceous, a pale dot at base of stigma. A small hyaline spot at angle between marginal and second submarginal cell, and one just beyond upper corner of third discoidal. Venation practically as in *aethiops*, but the marginal cell not so narrow in proportion to its length. Legs black, knees and external bases (half, more or less) of tibiæ pale yellow, tarsi pale yellow, the terminal joints becoming brown. Claws only slightly bifid. Abdomen densely punctured, the apical margins of the segments smooth and constricted. ♀.—Length about 7 mm., more robust, abdomen broader, segments not constricted, punctuation in general finer, legs with dirty white hairs, dense on hind pair. Legs dark, with a light yellow spot at extreme base of each of the anterior and middle tibiæ. Face wholly dark.

Habitat.—New Mexico; the ♀ on *Bigelovia Wrightii*, at Las Cruces, Sept. 23rd, 1895; the ♂ at Albuquerque, middle of August, 1895.

This species is a sort of small brother of *C. aethiops* (Cr.), from which it is easily distinguished not only by its size, but by the sculpturing of the metathorax. *C. aethiops*, also, does not have the shining boss at the summit of the eyes, which is present in both sexes of *fraterculus*. I have taken *C. aethiops* at Las Cruces, N.M., Sept. 21, 1895, on *Helianthus annuus*.

*Calliopsis perlævis*, n. sp., ♀.—Length, 8 mm., black, shining; face and thorax without pale markings. Head subquadrate, not particularly large, a little longer than broad; clypeus rather prominent, produced into a tooth on each side; mandibles dark reddish at ends; face, clypeus, front, vertex and cheeks strongly punctured, the punctures smallest and most dense on front and beneath antennæ; antennæ reaching as far as base of wings, joints 6 to 10 of flagellum testaceous beneath. Mesothorax shining, with small shallow punctures, fairly dense in front and at sides, but becoming sparse towards the middle, and almost lacking in the middle. Scutellum with sparse punctures, base of metathorax longitudinally wrinkled. Pubescence of head and thorax sparse, very pale brownish, most noticeable on cheeks, occiput and pleura; only a few scattered hairs on sides of metathorax. Tegulae amber colour. Wings subhyaline, grayish, yellowish towards the base, costal nervure and stigma dark brown. The outermost nervures also dark brown, but the rest amber colour. Second submarginal a little shorter than first, narrowed about half to marginal. Legs dark, a rather ill-defined small yellow spot at base of each of the four anterior tibiæ, tarsi becoming rufescent. Hind legs with a copious clothing of hair. Abdomen shining, parallel-sided, the apical

margins of segments 2 and 3 becoming rufescent. Punctures of dorsum minute and close, on first segment extremely sparse and small.

Habitat.—Las Cruces, New Mexico; two on sunflowers, October 6th, 1895. By its smooth surface it comes nearest to *C. margaritensis*, Fox, but that is a smaller insect.

*Calliopsis Boylei*, n. sp., ♂.—Length a little over 7 mm., very slender, black with yellow markings. Head somewhat broader than long; antennæ very long, entirely black; face flattened, the clypeus not projecting; entirely bright lemon-yellow nearly up to the level of the antennæ, the upper edge of the yellow straight right across the face, the yellow projecting above this only for a short distance, very narrowly, on orbital margins. The supraclypeal yellow area is about square. The labrum is also yellow, as well as part of the mandibles without. There is an impressed line down the middle of the clypeus, failing anteriorly. Face with large scattered punctures, almost lacking on supraclypeal area and close to the impressed line of clypeus; front, vertex and cheeks closely punctured. Pubescence of head and thorax sparse, tinged yellowish; anterior sides of clypeus with long white, very distinctly plumose hairs. Mesothorax shining, with distinct, rather close punctures, parapsidal grooves distinct. Scutellum with large, not very close, punctures. Base of metathorax transversely wrinkled, the area behind this not smooth, but minutely roughened. Sides of metathorax fringed with hairs. Tubercles with a chrome-yellow spot, tegulae shining testaceous. Wings yellowish-hyaline, nervures and stigma dark chestnut-brown, costal nervures black, marginal cell unusually long, 2nd submarginal narrowed one-half to marginal. Legs black, with the knees, the anterior tibiae in front, a spot at base and apex of middle tibiae, nearly the basal third and the apical eighth of hind tibiae, pale orange. Tarsi pale orange, the terminal joints darkened. Claws long and curved, only cleft at extreme tips. The hind legs are very long; the middle tibiae are very short, hardly half as long as the hind tibiae. Abdomen long and slender, black, the bases of the segments after the first with a fine light pile, very noticeable when the insect is held sideways. Dorsal surface of abdomen, except the broad impressed apical margins of the segments, finely and closely punctured, the punctures extremely small and close, except on the first segment.

Habitat.—Santa Fé, New Mexico; Aug. 2nd, 1895; given to me by V. Boyle, with the statement that it was caught on *Cleome serrulata*.

By its face-markings this resembles *C. compositarum*, Rob., but it differs at once from that in its less densely punctured mesothorax, and the longer marginal cell.

## NEW HAMPSHIRE HESPERIDÆ.

BY W. F. FISKE, MAST YARD, N. H.

All of the following species occur in the town of Webster, about ten miles north-west of Concord :—

*Carterocephalus Mandan*, Edw.—This is one of the rarest species in this section. It occurs in but one locality—a grassy bank by the roadside. Middle of June.

*Ancyloxypha Numitor*, Fab.—Common around very wet, grassy swamps in June and again in August.

*Pamphila Hobomok*, Harris.—One of the most common ; the third *Pamphila* to make its appearance in the spring, usually about the first of June. Very general in its habit, frequenting both wet and dry land, but preferring a moist, bushy pasture, with plenty of bramble blossoms.

Var. *Pocohontas*, Scud.—Appears about a week later than *Hobomok*. Rather scarce.

*Pamphila Sassacus*, Harris.—The second *Pamphila* to make its appearance in the spring, about a week before *Hobomok*. Common.

*Pamphila Metea*, Scud.—The earliest *Pamphila*, appearing about May 15th. It frequents very dry, sandy land, where little vegetation exists, except "bunch grass" and sweet fern. The former—scientific name unknown, but variously known as "bunch grass," "wolf grass," "hassock grass"—is very probably the food plant. Owing to its early appearance and peculiar haunts, it long escaped the notice of previous collectors in this section. One brood only observed.

*Pamphila Leonardus*, Harris.—The last butterfly to emerge as a first brood. Somewhat common in clover fields last of August and first of September, but rather hard to capture in good condition. With exception of *Cernes*, it is the most difficult *Pamphila* to approach when not feeding.

*Pamphila Otho*, var. *Egeremet*, Scud.—Rather scarce, frequenting moist roadsides and bushy pastures. First specimen appearing about July 10th. I have a curious specimen (a ♀), probably a variation of this species, in which the spots on both sides of the primaries are larger and more sharply defined, and there is a row of four or five faint spots on the upper side of the secondaries. The clouded band or row of spots on the under side of the secondaries is condensed into a row of distinct small spots, giving it a very different general appearance.

*Pamphila Peckius*, Kirby.—One of the most common, about equally common with *Cernes*, *Metacomet*, and *Hobomok*. Three broods: it accompanies *Mystic* in June, *Metacomet* in July, and *Leonardus* in August and September. A few specimens on the wing as late as October, which may be fragments of a fourth brood. There is a rather scarce form in which the yellow spot on the under side of the secondaries is divided quite in two, and another form in which the spots on the upper side of the secondaries are missing, giving the male—were it not for the stigma—a very close resemblance to *Cernes* on the upper side.

*Pamphila Mystic*, Scud.—The most common. Appears about June 5th and again, though very rarely, about September 1st. The male varies considerably; in many cases, when superficially observed, closely resembling *Sassacus*.

*Pamphila Cernes*, Edw.—Common; appearing about June 15th and again, though rarely, in August. There are probably more variations in this species than in any other native one. One of the most odd is a female in which the subapical spots are entirely wanting and the others are very much reduced in size.

*Pamphila Manataqua*, Scud.—Rather rare. July 10th to August. All the males yet taken have had a row of four or five indistinct spots on the upper side of the secondaries, but not always on the under side. As is the rule with most species of butterflies, the males appear some time before the females.

*Pamphila Metacomet*, Harris.—Common; about June 20th or 25th to middle of July. Female varies much in the number and size of the white spots. I have seen specimens of *Cernes*, *Metacomet*, and *Bimacula* (with the white fringe worn off) which it would be almost impossible to tell apart without examining the under sides. I once observed a very ardent courtship carried on by a male *Peckius* towards a female *Metacomet*. The female, however, seemed to be a little disgusted with her admirer, and kept flying about from point to point. The *Peckius* followed her, however, until an unintentional movement on my part frightened it away.

Speaking of inter-specific matings, a person who, though not an entomologist, has observed butterflies a good deal, and helped me not a little, solemnly affirmed that he had seen an *Argynnис Idalia* in coitus with *Phyciodes*, sp. This is "coming it a little too strong."

*Pamphila Bimacula*, G. and R.—Somewhat common in very wet meadows, in June and July. The ♀'s are apparently much in excess,

contrary to the general rule. It flies with a long, straight flight peculiar to this species, dropping suddenly into the grass, and hard to observe unless flushed, owing to its colour being so like the stubble. Because of its peculiar habits it might, like *Pam. Metea*, pass as a great rarity. It has frequently been observed by me feeding on the flowers of *Arethusa*, a very fragrant orchid growing in wet meadows among the grass, and later in the season on swamp milkweed.

*Pamphila Delaware*, Edw.—One specimen only. July 10th, 1894.  
Wet meadow.

*Amblyscirtes Vialis*, Edw.—Somewhat common. May and June.

*Amblyscirtes Samoset*, Scud.—Not nearly as common as *Vialis*, and not on the wing so early.

*Nisoniades Brizo*, Bd.-Lec.—Scarce. Early June.

*Nisoniades Icelus*, Lint.—Common. May, June. It is very possible, as I have given this species very little study, that there may be another species in company with it. According to Scudder, *Lucilius* should be found here.

*Nisoniades Persius*, Scud.—Scarce in July and August. Probably a second brood, but as it would be difficult to distinguish from *Icelus* on the wing, the first brood might easily escape notice.

*Nisoniades Juvenalis*, Fabr.—Somewhat common in June.

*Eudamus Pylades*, Scud.—Very common in June.

*Eudamus Bathyllus*, Sm. and Abb.—While looking over a series of native *Pylades* this winter my attention was struck by the appearance of a specimen which Mr. Skinner pronounces to be *Bathyllus*. I remember nothing about the capture of the specimen, and never having looked for the species, or expected to meet with it so far north, I can say nothing as to its habits or numbers.

*Eudamus Tityrus*, Fabr.—Formerly scarce, but of late years common. The last season it was as common as *Pylades*. I have frequently noticed the female hovering over patches of wild bean (*Phaseolus perennis*), but not until last season did I find larvæ on this plant. Out of several such larvæ one *Tityrus* emerged this winter from a forced pupa. I have also seen larvæ on garden beans, which were probably this species.

There are several more species of *Hesperiidae* which ought to be found in this locality, but the preceding are all that I have met with. If the season of 1896 is a good one, I hope ere it closes to add something to the knowledge of this family.

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## ON TWO INTERESTING NEW GENERA OF SCALE INSECT PARASITES.

BY L. O. HOWARD, WASHINGTON, D. C.

Nearly all the Chalcidid parasites of Coccidae belong to the sub-families Aphelininae and Encyrtinae. So universal is this rule that it is remarkable to rear anything else from a Coccid (excluding, of course, hyperparasites)\*. One or two Mymarids and the species of the curious subfamily Signiphorinae live in the eggs of scale insects, and we are just beginning to realize that there is a peculiar group of genera allied to the old subfamily Pireninae which also have this habit.

The first of these insects to be recognized as a primary scale insect parasite was a species of the genus *Tomocera* described by the writer in 1880 and reared from *Lecanium oleæ* from California. This name in 1885 was changed to *Dilophogaster* on account of the occurrence in Thysanura of a genus *Tomocerus*. In the meantime, however, Cameron had erected for the same form, from specimens received from the Hawaiian Islands, his genus *Moranilla*. According to the present rules of classification, however, *Tomocera* may stand in spite of its identical etymological significance with *Tomocerus*.

Another of these genera was described by Dr. Riley in 1890 as *Ophelosia* from specimens reared from *Icerya purchasi* in Queensland. A third—Walker's genus *Eunotus*—has recently been found by Mr. W. G. Johnson to be parasitic upon Lecanium scales in Illinois, as pointed out by the writer in Technical Bulletin No. 1, Division of Entomology, U. S. Department of Agriculture, and a fourth—*Scutellista*, Mots.—has been found by Dr. Berlese to parasitize Ceroplastes scales in Italy. This form has been redescribed with synonymous notes by the writer in the "Revista di Patologia Vegetale."

Aside from the matter of tibial armature, these genera seem closely allied and to possess on the whole strong mutual affinities. The shape of the head, its acute occipital margin, the mesonotal characters, the 10-jointed ( $\text{♀}$ ) and 9-jointed ( $\text{♂}$ ) antennæ, the greatly enlarged second segment of the abdomen, together with other characters point to a subfamily not yet recognized in our classification of the Chalcididae, and the uniform Coccid-feeding habit binds the group still more closely together.

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\* Representatives of *Pachyneuron*, *Euneura*, and *Hypsicamara* have been reared from Coccidae, but those of *Pachyneuron* are almost certainly hyperparasites, and the others may be; while the species of *Tetrastichus* quite commonly so reared are undoubtedly secondary.

In view of these facts, the receipt of two additional allied genera, also Coccid-feeders, and undescribed, from Mr. W. Maskell, of New Zealand, becomes a matter of considerable interest.

**APHOBETUS, n. g.**

*Female*.—Antennæ 10-jointed, clavate, inserted just above clypeus, scape slender, not reaching to middle ocellus, pedicel long, three times as long as first funicle joint, funicle joints 2 to 5 increasing slightly in length and considerably in width, club ovate, slightly broader than funicle joint 5 and longer than 4 and 5 together. Eyes naked; parapsidal sutures meeting axillar sutures; scutellum broad at base, with a distinct transverse groove at apical third. Petiole broad, distinct, abdomen without the white basal tufts characteristic of *Tomocera*, second segment very long, three times as long as remaining segments together. Marginal vein of fore wings somewhat longer than stigmal, postmarginal evident, but shorter than stigmal; basal nervure distinct. Hind wings broad and furnished with a strong basal vein running nearly at right angles into disc of wing for some little distance at extremity of submarginal. Hind coxae somewhat swollen, middle tibiae with a moderate spur, hind tibiae with a very long spur, a little longer than first tarsal joint.

*Male*.—Differs mainly in antennæ, which are 9-jointed; scape longer than in the female, pedicel somewhat swollen, joints 1 to 4 of funicle with long hairs, strongly incised from above at extremities and each joint slightly pedicillate; joint 1 longest, twice as long as pedicel, joints 2, 3 and 4 each becoming shorter, club somewhat ovate, with its first joint distinctly separated and as a whole longer than funicle joint 4, but shorter than 3 and 4 together. Body flat, abdomen somewhat elongate, second segment somewhat longer than remaining joints together.

*Aphobetus Maskelli*, n sp.

*Female*.—Length, 1.16 mm.; expanse, 2.4 mm.; greatest width of fore wings, .51 mm. General colour blue-black, slightly metallic, glistening. Face with faint shallow, sparse depressions; mesoscutum delicately shagreened, abdomen smooth, shining, hairs of mesonotum black, fimbria of metanotum rather sparse, grayish; pleura shining; antennæ honey-yellow, with pedicel and scape above darker; all coxae and femora black, the latter yellowish at tip; all tibiae dark in middle, yellowish at either end; wing veins dark brown, except basal vein of fore wings, which is lighter; fore wings with circular fuscous patch occupying centre of wing.

*Male*.—Somewhat slenderer than female, but about same length; sculpturing identical, antennæ jet black, legs coloured as with female.

One female, four males, reared by W. M. Maskell, New Zealand, from *Ctenochiton viridis*. This is probably the insect figured by Mr. Maskell on Plate XXIII. of his "Scale Insects of New Zealand," 1887.

*Anysis*, n. g.

*Female*.—Antennæ as with *Aphobetus*, except that funicle joint 2 is twice as long as 1; 3, 4 and 5 subequal in length, increasing in width, and each slightly shorter than 2. Eyes naked; head very broad; occiput strongly concave, its superior margin acute. Thorax well arched; parapsidal sutures meeting axillar sutures; scutellum broad at base, somewhat lengthened, extending over metanotum to vertical plane of base of abdomen, not cross-furrowed. Petiole distinct but very short; abdomen without basal tufts; second segment scarcely half the length of abdomen. Marginal vein of fore wings three times longer than stigmal, postmarginal about as long as stigmal or slightly shorter; basal nervure not distinct. Basal nervure of hind wings extending at an acute angle toward base of wing. Spur of hind tibia short.

*Anysis australiensis*, n. sp.

*Female*.—Length, 1.7 mm.; expanse, 3.8 mm.; greatest width of fore wings, .74 mm. General colour blue-black, slightly metallic, glistening. Head and thorax with short, sparse, yellowish pile; face delicately shagreened and with fine sparse punctures; mesonotum similarly punctured; metanotum, pleura, and abdomen smooth; metanotum with a median longitudinal rounded carina. Antennæ light brown, tip of club darker, pedicel and tip of scape above black; all femora nearly black in middle, lighter at either end; tibiae brown. Wing veins dark brown, fore wings infuscated, hind wings hyaline.

Three females received from Mr. W. M. Maskell with the following note: "With a very curious new Coccid from West Australia, genus not yet determined; probably allied to *Eriococcus*."

MISS ORMEROD, who was for some years Consulting Entomologist to the Government, her knowledge of the insect world being unapproached by any other living authority, has now received the distinction of being appointed an examiner in this branch of agricultural science at Edinburgh University.—*Illustrated London News*.

## CORRESPONDENCE.

## THE MUTILIID GENUS CHYPHOTES.

On Aug. 21, 1894, I found at Santa Fé a specimen of *Chyphotes*, which I thought might prove to be a new species, as the legs are brown, with the femora and tibiae, except their ends, black. The abdomen is also more elongate than in Blake's figures of *C. elevatus*, and the third segment is fuscous. The length of the insect is 9 mm. Mr. Fox, after comparing it with Blake's types, is persuaded that it is only a form of *elevatus*. It follows the rule already observed in certain bees of the genus *Perdita*, that individuals from higher elevations are darker.

The most curious thing developing from the examination of this specimen was, that Blake's account of the palpi of *Chyphotes* is all wrong. My example has the palpi honey-colour, maxillary palpi 6-jointed, lateral palpi 4-jointed. Formula for maxillary palpi 3 (46) (25) 1. Second joint of lateral palpi broadened. When I called Mr. Fox's attention to this, he wrote back that *C. elevatus* was really similar, the description being wrong.

T. D. A. COCKERELL.

## PROPOSED BIOLOGICAL STATION.

The undersigned has it in view to found in New Mexico a Biological Station, and health and holiday resort for scientific persons, teachers, and kindred spirits. No loafers would be admitted, nor persons whose health was so poor as to prevent them from working.

Practically no funds are at present available, but it is hoped that if a very modest start is made, the means may in time be found to put the institution on a secure and permanent basis.

In such an establishment, scientific work may be carried on without any fear of interference by politicians and other self-interested or ignorant persons; while the Station might also come to be recognized as an independent educational centre, helping to promote the best interests of education in the broadest sense, as well as those of pure science.

The promoter hopes to be able, sooner or later, to secure the co-operation of a number of persons who will engage in the work for its own sake, and will not object to necessary privations or be afraid of the inevitable difficulties. Without enthusiasm, nothing can be done.

Three years' experience in this country gives the writer the highest opinion of the value of the climate for persons in the earlier stages of

phthisis (as he was himself when he came here); while the abundance of new and interesting forms of life, especially among the insects, is remarkable. Many interesting general problems, such as those of the life-zones, can also be studied in New Mexico to great advantage.

A beginning will be made this summer if students can be found. The undersigned will be glad to hear from any who are interested in the matter, and especially from those who might be inclined to work with him for longer or shorter periods during the present summer.

May 4, 1896.

T. D. A. COCKERELL,  
Las Cruces, New Mexico, U. S. A.

A MOTH OUT OF PLACE.

There has been added to the Society's collection a moth of more than ordinary interest. I sent to Prof. J. B. Smith, for determination, a box of specimens which were to me either new or doubtful. He kindly and promptly returned the same with the names of all except one, which was a *Plusia* quite new to him, and retained it for further study. In the letter to me accompanying the names, the Professor remarked: "No. 12 (*Teniocampa vegeta*) is rather a surprise to me from your locality. Of course, it is not a *Teniocampa*, but it has been so described." He then referred me to his catalogue of the Noctuidæ (Bulletin 44, of the U. S. N. M.) for what was known concerning the species. So I turned to it and found this on page 207:

"*T. vegeta*, Morr.

"1875. Morr., Proc. Ac. Nat. Sci., XXVII., 432, *Teniocampa*.

"Habitat.—Texas.

"The type is in the Tepper collection. A correctly named specimen is also in the British Museum, from the Grote collection. The species is not a *Teniocampa*, and probably belongs to the fasciatae; but in default of sufficient study to place it certainly, I leave it here for the present. Mr. Slingerland has called my attention to the fact that *Cissusa spadix*, of Cramer, heretofore referred as a synonym of *Drasteria erechtea*, is a distinct species. On examination I find this to be the fact, and it is more than likely that it will prove the same as the above species. Material for study is lacking, therefore the reference can not be positively made."

So it yet remains inaccurately placed from want of sufficient material for study. It seems also to have got far away from its supposed proper place of residence. Taken in London, at electric light, about the middle of April, 1896.

J. ALSTON MOFFAT.

## BOOK NOTICES.

THE TAXONOMIC VALUE OF THE ANTENNÆ OF LEPIDOPTERA. BY DONALDSON BODINE, TRANS. AMERICAN ENTOMOLOGICAL SOCIETY, XXIII., PP. 1-56, PLATES I.-V., 1896.

Mr. Bodine finds good characters in the finer external structure of the antennæ, especially the sculpturing and the distribution of the different types of sensory hairs. Prof. Comstock's suborders are abundantly confirmed. Not only does Mr. Bodine find that the antennæ of *Hepialus* and *Micropteryx* separate them sharply from all the frenatae, but he considers the jugatae even more nearly allied to the *Trichoptera* than to the other Lepidoptera. Mr. Bodine does not attempt a rigid classification of the frenatae on antennal characters which would have been desirable; but draws attention to a number of special affinities. The only one of these which is at all disturbing to the most recent views is that which implies a close relationship between the *Sphingidae* and *Sesiidae* (p. 36). In spite of the close similarity in structure of the antennæ, I do not think that this view which derives the *Sphingidae* from the *Sesiidae*, and therefore from the Tineids, will obtain. There seem to be too many objections on other grounds.

HARRISON G. DYAR.

THE CRAMBIDÆ OF NORTH AMERICA, by C. H. Fernald, A. M., Ph. D., Massachusetts Agricultural College, 1896.

This little book of less than one hundred pages is really an admirable monograph of this family of Grass-moths. In the introduction, the author briefly relates the injury that is often done by these insects to grass crops, and mentions some of the natural enemies that keep them in check. He then gives an historical account of the family in the writings of Entomologists, and after a chapter on the external anatomy, proceeds to give descriptions of the genera and species, including the preparatory stages as far as known. The synoptical tables of genera and species are excellent, and afford a ready means of identifying a specimen when made use of in connection with the clear and concise descriptions and the beautiful illustrations. Besides a few wood-cuts in the text, there are three plates depicting the anatomy and wing venation of the family, and six exquisite coloured plates of the species. We trust that collectors will now be induced to study this family, as the way has been made so easy for them, and then be encouraged to investigate other families of Microlepidoptera.

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